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GLENN PATENT GROUP 3475 EDISON WAY, SUITE L MENLO PARK, CA 94025			EXAMINER YIP, JACK	
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			3715	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/804,992

**Applicant(s)**

HEINZ ET AL.

**Examiner**

JACK YIP

**Art Unit**

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 January 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 October 2004 and 03 August 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB08)  
Paper No(s)/Mail Date 8/26/2004
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Response to Amendment***

1. In response to the amendment filed 1/30/2009; claims 1 - 21 are pending; claim 22 is withdrawn.

***Claim Rejections - 35 USC § 101***

2. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 1 - 21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Re claims 1, 21: Claim 1 discloses "Apparatus for analyzing a sound signal..." and Claim 21 discloses "Method of analyzing a sound signal...". The claims are directed toward an apparatus and method. However, the claimed invention is directed towards the judicial exception of an abstract idea (analyzing a sound signal). No physical transformation is present to establish a practical application of the abstract idea. Furthermore, the claim does not produce a useful, concrete, and tangible result. The claimed invention results in analyzing a sound signal, but the analysis is not applied for any purpose in the claim. Therefore, the method produces a non-tangible result since the sound signal is not used for any purpose and the method amounts to mere manipulation of data. Thus, the claim is directed towards non-statutory subject matter.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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**5. Claims 1, 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Holton et al. (US 5,381,512).**

Re claims 1, 21:

[Claim 1] Holton discloses an apparatus for analyzing a sound signal (Holton, Abstract), comprising:

an ear model for deriving (Holton, Abstract), for a number of inner hair cells, an estimate for a time-varying concentration of a transmitter substance inside a cleft between an inner hair cell and an associated auditory nerve from the sound signal, so that an estimated inner hair cell cleft contents map over time is obtained; and (Holton, col 24, lines 54 - 68; col 25, lines 1 - 67; col 26, lines 1 - 32)

a pitch analyzer for analyzing the cleft contents map to obtain a pitch line over time, a pitch line indicating a pitch of the sound signal for respective time instants (Holton, fig 2A - 2B and associated text).

[Claim 21] Holton discloses a method of analyzing a sound signal, comprising the following steps:

deriving, for a number of inner hair cells, an estimate for a time-varying concentration of a transmitter substance inside a cleft between an inner hair cell and an associated auditory nerve from the sound signal, so that an estimated inner hair cell cleft contents map over time is obtained; and

analyzing the cleft contents map to obtain a pitch line over time, a pitch line indicating a pitch of the sound signal for respective time instants (See claim 1).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holton et al. (US 5,381,512).**

Re claim 4

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Holton discloses an apparatus, in which the ear model is operative to calculate a transmitter concentration for inner hair cells, wherein each inner hair cell is associated with a specified area of a modeled basilar membrane, and wherein each inner hair cell has associated therewith a different specified area of the modeled basilar membrane (Holton, abstract; "Each output waveform corresponds to excitation at different locations along the basilar membrane in the cochlea ..."; col 4, lines 15 - 44).

Holton does not disclose expressly that the ear model is operative to calculate a transmitter concentration for at least 100 inner hair cells. At the time the invention was made, it would have been an obvious matter of design choice to a person of ordinary skill in the art to calculate a transmitter concentration for at least 100 inner hair cells because applicant has not disclosed that 100 inner hair cells provides an advantage, is used for a particular purpose, or solves a stated problem. One of ordinary skill in the art, furthermore, would have expected to calculate a transmitter concentration for adequate number of inner hair cells to accurately represent the modeled basilar membrane.

**8. Claims 2, 9 - 16, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holton et al. (US 5,381,512) in view of Herre et al. (US 2004/0068401 A1).**

Re claim 2:

Holton does not disclose an apparatus, further comprising a rhythm analyzer for analyzing estimates for selected inner hair cells, the inner hair cells being selected in accordance with the pitch line, so that segmentation instants are obtained, wherein a segmentation instant indicates an end of a preceding note or a start of a succeeding note. However, Herre teaches a device and method for analyzing an audio signal in view of obtaining rhythm information (Herre, Abstract). Herre further teaches (Herre, [0016]) rhythm information of every sub-band is evaluated in means 304a to 304c. For every input signal, first, an envelope-like output signal is calculated (with regard to a so-called inner hair cell processing in the ear) and sub-sampled. From this result, an autocorrelation function (ACF) is calculated, to obtain the periodicity of the signal as a function of the lag. Therefore, in view of Herre, it would have been obvious to one of ordinary skill in the art, at the time of invention, to modify the apparatus described in Holton, by

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providing the rhythm analyzer as taught by Herre, since Herre states (Herre, abstract) rhythm information enables a more robust analysis of an audio signal.

Re claim 9:

Holton discloses an apparatus, in which the rhythm analyzer includes a searcher for searching a dominant estimate for a transmitter concentration in a specified time period and having a dominant frequency determined by the pitch line so that, for adjacent time periods, corresponding dominant estimates for different inner hair cells are obtained, wherein the searcher is operative to acknowledge a dominant estimate, when the dominant estimate is above a threshold (Holton, fig 1, 112; col 8, lines 14 - 47; "neutral threshold-crossing stage").

Re claim 10:

Holton discloses an apparatus, in which the threshold is an amplitude of an estimate having the second largest amplitude so that the dominant estimate has the largest amplitude in a specified time period (Holton, col 8, lines 58 - 67; col 9, lines 1 - 35; fig 3).

Re claim 11:

Holton discloses an apparatus, in which the rhythm analyzer is operative to build an onset map by calculating an onset value for a dominant estimate for a specified time period, the onset map including a sequence of onset values (Holton, fig 7B, fig 9, fig 11, fig 14, fig 16).

Re claim 12:

Holton discloses an apparatus, in which the rhythm analyzer is operative to calculate an onset value such that an onset value is higher, when an onset has a stronger onset rise, compared to another onset having a weaker onset rise (Holton, fig 7B, fig 9, fig 11, fig 14, fig 16; col 8, lines 58 - 67; col 9, lines 11 - 35).

Re claim 13:

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Holton discloses an apparatus, in which the rhythm analyzer is operative to calculate an onset value such that the onset value is higher, when a starting level before an onset is lower compared to another onset having a higher starting level (Holton, fig 7B, fig 9, fig 11, fig 14, fig 16; col 8, lines 58 - 67; col 9, lines 11 - 35).

Re claim 14:

Holton discloses an apparatus, in which the rhythm analyzer is operative to use an estimate (See claim 2) for an inner hair cell representing a fundamental vibration or using an estimate for an inner hair cell representing at least one higher partial vibration.

Re claim 15:

Holton discloses an apparatus, in which the rhythm analyzer is operative to build an onset histogram by combining onset values of estimates for an inner hair cell (Holton, fig 7B, fig 9, fig 11, fig 14, fig 16; col 8, lines 58 - 67; col 9, lines 11 - 35) representing the fundamental vibration, and onset values of an estimate for an inner hair cell (Holton, fig 7B, fig 9, fig 11, fig 14, fig 16; col 8, lines 58 - 67; col 9, lines 11 - 35) representing at least one higher partial vibration, which have a time distance smaller than a specified time distance threshold (Holton, col 8, lines 14 - 47).

Re claim 16:

Holton discloses an apparatus, in which the rhythm analyzer is operative to extract maxima from the onset histogram, wherein a time value associated with a maximum indicates a segmentation instant (Holton, col 17, lines 56 - 67; col 18, lines 1 - 26).

Re claim 20:

Holton discloses an apparatus, further comprising a transcription module, the transcription module being operative for using the pitch line segmented at segmentation instants to output a note description (Holton, abstract, "output waveform") or a MIDI description.

9. **Claims 5 - 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holton et al. (US 5,381,512) in view of Herre et al. (US 2004/0094019 A1 denoted hereinafter as Herre'019).**

Re claim 5:

Holton discloses a pitch analyzer further comprises a vibration period detector (Holton, fig 9; col 16, lines 30 - 50). But Holton does not disclose an apparatus, the vibration period detector being operative for calculating a summary auto correlation function for each time period of a number of adjacent time periods using the estimates for the transmitter concentrations of the number of inner hair cells, and wherein the vibration period detector is further operative, for each inner hair cell, to calculate at least one period between two adjacent maxima in one estimate, and to enter a result into a summary auto correlation function histogram. However, Herre'019 teaches an apparatus for analyzing an audio signal with regard to rhythm information of the audio signal by using an autocorrelation function (Herre'019, Abstract). Herre'019 further teaches (Herre'019, [0015]) rhythm information of every sub-band is evaluated in means 304a to 304c. For every input signal, first, an envelope-like output signal is calculated (with regard to a so-called inner hair cell processing in the ear) and sub-sampled. From this result, an autocorrelation function (ACF) is calculated, to obtain the periodicity of the signal as a function of the lag. Therefore, in view of Herre'019, it would have been obvious to one of ordinary skill in the art, at the time of invention, to modify the apparatus described in Holton, by providing the auto correlation function as taught by Herre'019, since it was known that autocorrelation is a mathematical tool for finding repeating patterns, such as the presence of a periodic signal which has been buried under noise, or identifying the missing fundamental frequency in a signal implied by its harmonic frequencies.

Re claim 6:

Holton discloses an apparatus, in which the pitch analyzer is operative to retrieve a maximum value from each histogram of the time sequence of histograms, the maximum value representing a pitch in the time period so that pitch line points are obtained (Holton, col 17, lines 56 - 67; col 18, lines 1 - 26).



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Re claim 7:

Holton discloses an apparatus, in which the pitch analyzer is further operative to build pitch line subtrajectories by combining pitch line points being close in time with respect to a time threshold and being close in frequency with respect to a frequency threshold (Holton, col 8, lines 58 - 67; col 9, lines 1 - 59; col 11, lines 63 - 67; col 12, lines 1 - 24).

Re claim 8:

Holton discloses an apparatus, in which the pitch line analyzer is further operative to fuse pitch line subtrajectories with a minimum length and to discard any subtrajectories not fulfilling a criterion related to a minimum length and amplitude (Holton, col 8, lines 58 - 67; col 9, lines 1 - 59; col 11, lines 63 - 67; col 12, lines 1 - 24).

**10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holton et al. (US 5,381,512) in view of Gilman (US 5,176,620).**

Re claim 3

Holton does not disclose an apparatus in which the ear model includes a mechanical ear model and an inner hair cell model. However, Gilman teaches a hearing aid having a liquid transmission means communicative with the cochlea and method (Gilman, abstract). Gilman further teaches a mechanical ear model for modeling an auditory mechanical sound processing up to the inner ear (cochlea) to obtain estimates for representations of mechanical vibrations of the basilar membrane and lymphatic fluids (Gilman, fig 4 and associated text); and an inner hair cell model for transforming the estimates for representations of mechanical vibrations into the estimates for the transmitter concentrations at the inner hair cells (Gilman, fig 4 and associated text). Therefore, in view of Gilman, it would have been obvious to one of ordinary skill in the art, at the time of invention, to modify the apparatus described in Holton, by providing the model as taught by Gilman, since such modification would provide hearing aid to the hearing disabilities.

**11. Claims 17, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holton et al. (US 5,381,512) in view of Hartley (US 5,417,113).**

Re claim 17:

Holton does not disclose an apparatus, further comprising a timbre recognition module. However, Blamey teaches a timbre recognition module being operative for: constructing a feature vector; feeding the feature vector into a pattern recognition device; and obtaining a result indicating a probability that at least a portion of the sound signal has been produced by a sound source from a number of different specified sound sources (Hartley, col 6, lines 63 - 67; From col 7). Therefore, in view of Hartley, it would have been obvious to one of ordinary skill in the art, at the time of invention, to modify the apparatus described in Holton, by providing the timbre recognition as taught by Harley, since such modification would allow the sound sources to be recreated by the system.

Re claim 19:

Holton discloses an apparatus, in which the feature vector includes one or more selected members from a feature group including onset time of a fundamental vibration or a higher order partial vibration, a frequency of a fundamental vibration or a higher order partial vibration, an amplitude of a fundamental vibration or a higher order partial vibration, a number of an estimate for the transmitter concentration using the highest peak for the fundamental vibration or a higher order partial vibration, or a number of an estimate for the transmitter concentration being in resonance for a fundamental vibration or a higher order partial vibration (Holton, fig 7B, fig 9, fig 11, fig 14, fig 16; col 8, lines 58 - 67; col 9, lines 11 - 35).

**12. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holton et al. (US 5,381,512) in view of Hartley (US 5,417,113) and Blamey et al. (US 2003/0171786 A1).**

Re claim 18:

Holton does not disclose an apparatus in accordance with claim 17, in which the pattern recognition device is a neural network. However, Blamey teaches a sound processor for a cochlear implant (Blamey,

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Abstract). Therefore, in view of Blamey, it would have been obvious to one of ordinary skill in the art, at the time of invention, to modify the apparatus described in Holton, by providing the neural network as taught by Blamey, since such modification would allow the system to attach directly to a person for accurate reading.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JACK YIP whose telephone number is (571)270-5048. The examiner can normally be reached on Monday - Friday 9:30am - 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Xuan Thai can be reached on (571)272-7147. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. Y./  
Examiner, Art Unit 3715

/XUAN M. THAI/  
Supervisory Patent Examiner, Art Unit 3715